U.S. Department
Of Transportation
Federal Aviation Administration

ADVISORY CIRCULAR

Subject: CHANGE 1 TO OBSTRUCTION MARKING AND LIGHTING

Date: 4/15/00
Initiated by: ATA-400

AC No: 70/7460-1 K
Change: 1

1. PURPOSE. This change amends the Federal Aviation Administration's (FAA) standards for marking and lighting structures to promote aviation safety. The Change Number and date of the change material are located at the top of the page.

2. EFFECTIVE DATE. This change is effective August 1, 2000.

3. EXPLANATION OF CHANGES.

a. Table of Contents. Change pages i through iii.

b. Change pages 19 through 32 beginning at Chapter 7. High Intensity Flashing White Obstruction Light Systems to read 21 through 34.

c. Page 1. Paragraph 1. Reporting Requirements. Owner changed to read sponsor.

d. Page 1. Paragraph 5. Modifications and Deviations. Owner changed to read sponsor.

e. Page 1. Paragraph 5.b.3. Voluntary Marking and/or Lighting. Owner/s changed to read sponsor.

f. Page 2. Paragraph d. Chapter 6 changed to read Chapter 12, Table 4.

g. Page 2. Paragraph d. Owners/proponents changed to read sponsors.

h. Page 2. Paragraph 6. Additional Notification. Proponents changed to read sponsors.

i. Page 2. Paragraph 7. Metric Units. Proponents changed to read sponsors.

j. Page 3. Paragraph 23. Light Failure Notification. Proponents changed to read sponsors.

k. Page 4. Paragraph 24. Notification of Restoration. Owner changed to read sponsor.

l. Page 7. Note. Change proponents to read sponsors.

m. Page 11. Paragraph 49. **Distraction.** Owner changed to read sponsor

n. Replace Pages Al-l through Al-19. New illustrations. In addition, mid-level lighting on structures beginning at 250 feet above ground level (AGL) has been corrected to reflect lighting beginning at 350 feet AGL.

for JOHN S. WALKER
Program Director for Air Traffic
Airspace Management

PAGE CONTROL CHART

AC 70/7460-1K, CHG. 1

Remove Pages	Dated	Insert Pages	Dated
i through iii	3/1/00	i through iii	8/1/00
1 through 4	3/1/00	1 through 4	8/1/00
7	3/1/00	7	8/1/00
11	3/1/00	11	8/1/00
Al-l through Al-19	3/1/00	Al-l through Al-19	8/1/00

CHAPTER 6. MEDIUM INTENSITY FLASHING WHITE OBSTRUCTION LIGHT SYSTEMS

CHAPTER 7. HIGH INTENSITY FLASHING WHITE OBSTRUCTION LIGHT SYSTEMS

CHAPTER 8. DUAL LIGHTING WITH RED/MEDIUM INTENSITY FLASHING WHITE SYSTEMS

CHAPTER 9. DUAL LIGHTING WITH RED/HIGH INTENSITY FLASHING WHITE SYSTEMS

CHAPTER 10. MARKING AND LIGHTING OF CATENARY AND CATENARY SUPPORT STRUCTURES

CHAPTER 11. MARKING AND LIGHTING MOORED BALLOONS AND KITES

CHAPTER 12. MARKING AND LIGHTING EQUIPMENT AND INFORMATION

APPENDIX 1: SPECIFICATIONS FOR OBSTRUCTION LIGHTING EQUIPMENT CLASSIFICATION

APPENDIX 2. MISCELLANEOUS

CHAPTER 1. ADMINISTRATIVE AND GENERAL PROCEDURES

1. REPORTING REQUIREMENTS

A sponsor proposing any type of construction or alteration of a structure that may affect the National Airspace System (NAS) is required under the provisions of 14 Code of Federal Regulations (14 CFR part 77) to notify the FAA by completing the Notice of Proposed Construction or Alteration form (FAA Form 7460-l). The form should be sent to the FAA Regional Air Traffic Division office having jurisdiction over the area where the planned construction or alteration would be located. Copies of FAA Form 7460-l may be obtained from any FAA Regional Air Traffic Division office, Airports District Office or FAA Website at www.faa.gov/ats/ata/ata400.

2. PRECONSTRUCTION NOTICE

The notice must be submitted:

a. At least 30 days prior to the date of proposed construction or alteration is to begin.

b. On or before the date an application for a construction permit is filed with the Federal Communications Commission (FCC). (The FCC advises its applicants to file with the FAA well in advance of the 30-day period in order to expedite FCC processing.)

3. FAA ACKNOWLEDGEMENT

The FAA will acknowledge, in writing, receipt of each FAA Form 7460-l notice received.

4. SUPPLEMENTAL NOTICE REQUIREMENT

a. If required, the FAA will include a FAA Form 7460-2, Notice of Actual Construction or Alteration, with a determination.

b. FAA Form 7460-2 Part 1 is to be completed and sent to the FAA at least 48 hours prior to starting the actual construction or alteration of a structure. Additionally, Part 2 shall be submitted no later than 5 days after the structure has reached its greatest height. The form should be sent to the Regional Air Traffic Division office having jurisdiction over the area where the construction or alteration would be located.

c. In addition, supplemental notice shall be submitted upon abandonment of construction.

d. Letters are acceptable in cases where the construction/alteration is temporary or a proposal is abandoned. This notification process is designed to permit the FAA the necessary time to change affected procedures and/or minimum flight altitudes, and to otherwise alert airmen of the structure's presence.

Note-
NOTIFICATION AS REQUIRED IN THE DETERMINATION IS CRITICAL TO AVIATION SAFETY

5. MODIFICATIONS AND DEVIATIONS

a. Requests for modification or deviation from the standards outlined in this AC must be submitted to the FAA Regional Air Traffic Division office serving the area where the structure would be located. The sponsor is responsible for adhering to approved marking and/or lighting limitations, and/or recommendations given, and should notify the FAA and FCC (for those structures regulated by the FCC) prior to removal of marking and/or lighting. A request received after a determination is issued may require a new study and could result in a new determination.

b. Modifications. Modifications will be based on whether or not they impact aviation safety. Examples of modifications that may be considered:

1. ***Marking and/or Lighting Only a Portion of an Object.*** The object may be so located with respect to other objects or terrain that only a portion of it needs to be marked or lighted.

2. ***No Marking and/or Lighting.*** The object may be so located with respect to other objects or terrain, removed from the general flow of air traffic, or may be so conspicuous by its shape, size, or color that marking or lighting would serve no useful purpose.

3. ***Voluntary Marking and/or Lighting.*** The object may be so located with respect to other objects or terrain that the sponsor feels increased conspicuity would better serve aviation safety. Sponsors who desire to voluntarily mark and/or light their structure should request the proper marking and/or lighting from the FAA to ensure no aviation safety issues are impacted.

4. ***Marking or Lighting an Object in*** Accordance with the Standards for an Object of ***Greater Height or Size.*** The object may present such an extraordinary hazard potential that higher standards may be recommended for increased conspicuity to ensure the safety to air navigation.

c. ***Deviations.*** The FAA regional office conducts an aeronautical study of the proposed deviation(s)

and forwards its recommendation to FAA headquarters in Washington, DC, for final approval. Examples of deviations that may be considered:

1. Colors of objects.
2. Dimensions of color bands or rectangles.
3. Colors/types of lights.
4. Basic signals and intensity of lighting.
5. Night/day lighting combinations.
6. Flash rate.

d. The FAA strongly recommends that sponsors become familiar with the different types of lighting systems and to specifically request the type of lighting system desired when submitting FAA Form 7460-L (This request should be noted in "item 2.D" of the FAA form.) Information on these systems can be found in Chapter 12, Table 4 of this AC. While the FAA will make every effort to accommodate the request, sponsors should also request information from system manufacturers. In order to determine which system best meets their needs based on purpose, installation, and maintenance costs.

6. ADDITIONAL NOTIFICATION

Sponsors are reminded that any change to the submitted information on which the FAA has based its determination, including modification, deviation or optional upgrade to white lighting on structures which are regulated by the FCC, must also be filed with the FCC prior to making the change for proper authorization and annotations of obstruction marking and lighting. These structures will be subject to inspection and enforcement of marking and lighting requirements by the FCC. FCC Forms and Bulletins can be obtained from the FCC's National Call Center at 1-888-CALL-FCC (1-888-225-5322). Upon completion of the actual change, notify the Aeronautical Charting office at:

NOAA/NOS
Aeronautical Charting Division
Station 5601, N/ACC113
1305 East-West Highway
Silver Spring, MD 20910-3233

7. METRIC UNITS

To promote an orderly transition to metric units, sponsors should include both English and metric (SI units) dimensions. The metric conversions may not be exact equivalents, and until there is an official changeover to the metric system, the English dimensions will govern.

20. STRUCTURESTO BE MARKED AND LIGHTED

Any temporary or permanent structure, including all appurtenances, that exceeds an overall height of 200 feet (61m) above ground level (AGL) or exceeds any obstruction standard contained in 14 CFR part 77, should normally be marked and/or lighted. However, an FAA aeronautical study may reveal that the absence of marking and/or lighting will not impair aviation safety. Conversely, the object may present such an extraordinary hazard potential that higher standards may be recommended for increased conspicuity to ensure safety to air navigation. Normally outside commercial lighting is not considered sufficient reason to omit recommended marking and/or lighting. Recommendations on marking and/or lighting structures can vary depending on terrain features, weather patterns, geographic location, and in the case of wind turbines, number of structures and overall layout of design. The FAA may also recommend marking and/or lighting a structure that does not exceed 200 (61m) feet AGL or 14 CFR part 77 standards because of its particular location.

21. GUYED STRUCTURES

The guys of a 2,000-foot (610m) skeletal tower are anchored from 1,600 feet (488m) to 2,000 feet (610m) from the base of the structure. This places a portion of the guys 1,500 feet (458m) from the tower at a height of between 125 feet (38m) to 500 feet (153m) AGL. 14 CFR part 91, section 119, requires pilots, when operating over other than congested areas, to remain at least 500 feet (153m) from man-made structures. Therefore, the tower must be cleared by 2,000 feet (610m) horizontally to avoid all guy wires. Properly maintained marking and lighting are important for increased conspicuity since the guys of a structure are difficult to see until aircraft are dangerously close.

22. MARKING AND LIGHTING EQUIPMENT

Considerable effort and research have been expended in determining the minimum marking and lighting systems or quality of materials that will produce an acceptable level of safety to air navigation. The FAA will recommend the use of only those marking and lighting systems that meet established technical standards. While additional lights may be desirable to identify an obstruction to air navigation and may, on occasion be recommended, the FAA will recommend minimum standards in the interest of safety, economy, and related concerns. Therefore, to provide an adequate level of safety, obstruction lighting systems should be installed, operated, and maintained in accordance with the recommended standards herein.

23. LIGHT FAILURE NOTIFICATION

a. Sponsors should keep in mind that conspicuity is achieved only when all recommended lights are working. Partial equipment outages decrease the margin of safety. Any outage should be corrected as soon as possible. Failure of a steady burning side or intermediate light should be corrected as soon as possible, but notification is not required. I

b. Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to the nearest flight service station (FSS) so a Notice to Airmen (NOTAM) can be issued. Toll-free numbers for FSS are listed in most telephone books or on the FAA's Website at www.faa.gov/ats/ata/ata400. This report should contain the following information:

1. Name of persons or organizations reporting light failures including any title, address, and telephone number.
2. The type of structure.
3. Location of structure (including latitude and longitude, if known, prominent structures, landmarks, etc.).
4. Height of structure above ground level (AGL)/above mean sea level (AMSL), if known.
5. A return to service date.
6. FCC Antenna Registration Number (for structures that are regulated by the FCC).

Note-l.

When the primary lamp in a double obstruction light fails, and the secondary lamp comes on, no report is required. However, when one of the lamps in an incandescent L-864 flashing red beacon fails, it should be reported.

2. After 15 days, the NOTAM is automatically deleted from the system. The sponsor is requested to call the nearest FSS to extend the outage date. In addition, the sponsor is required to report a return to service date. I

24. NOTIFICATION OF RESTORATION

As soon as normal operation is restored, notify the same AFSS/FSS that received the notification of failure. The FCC advises that noncompliance with notification procedures could subject its sponsor to penalties or monetary forfeitures.

25. FCC REQUIREMENT

FCC licensees are required to file an environmental assessment with the Commission when seeking authorization for the use of the high intensity flashing white lighting system on structures located in residential neighborhoods, as defined by the applicable zoning law. presented by a spherical marker.

f. Shielded Lights. If an adjacent object shields any light, horizontal placement of the lights should be adjusted or additional lights should be mounted on that object to retain or contribute to the definition of the obstruction.

47. MONITORING OBSTRUCTION LIGHTS

Obstruction lighting systems should be closely monitored by visual or automatic means. It is extremely important to visually inspect obstruction lighting in all operating intensities at least once every 24 hours on systems without automatic monitoring. In the event a structure is not readily accessible for visual observation, a properly maintained automatic monitor should be used. This monitor should be designed to register the malfunction of any light on the obstruction regardless of its position or color. When using remote monitoring devices, the communication status and operational status of the system should be confirmed at least once every 24 hours. The monitor (aural or visual) should be located in an area generally occupied by responsible personnel. In some cases, this may require a remote monitor in an attended location. For each structure, a log should be maintained in which daily operations status of the lighting system is recorded. Beacon lenses should be replaced if serious cracks, crazing, dirt build up, etc., has occurred.

48. ICE SHIELDS

Where icing is likely to occur, metal grates or similar protective ice shields should be installed directly over each light unit to prevent falling ice or accumulations from damaging the light units.

49. DISTRACTION

a. Where obstruction lights may distract operators of vessels in the proximity of a navigable waterway, the sponsor must coordinate with the Commandant, U.S. Coast Guard, to avoid interference with marine navigation.

b. The address for marine information ‘and coordination is:

Chief, Aids to Navigation
Division (OPN)
U.S. Coast Guard Headquarters
2100 2nd Street, SW., Rm. 3610
Washington, DC 20593-0001
Telephone: (202) 267-0980

a. Spherical Markers. Spherical markers are used to identify overhead wires. Markers may be of another shape, i.e., cylindrical, provided the projected area of such markers will not be less than that presented by a spherical marker.*t*

1. Size and Color.

The diameter of the markers used on extensive catenary wires across canyons, lakes, rivers, etc., should be not less than 36 inches (9lcm). Smaller 20-inch (51cm) spheres are permitted on less extensive power lines or on power lines below 50 feet (15m) above the ground and within 1,500 feet (458m) of an airport runway end. Each marker should be a solid color such as aviation orange, white, or yellow.

2. Installations.

(a) Spacing. Markers should be spaced equally along the wire at intervals of approximately 200 feet (61m) or a fraction thereof. Intervals between markers should be less in critical areas near runway ends (i.e., 30 to 50 feet (10m to 15m)). They should be displayed on the highest wire or by another means at the same height as the highest wire. Where there is more than one wire at the highest point, the markers may be installed alternately along each wire if the distance between adjacent markers meets the spacing standard. This method allows the weight and wind loading factors to be distributed.

(b) Pattern. An alternating color scheme provides the most conspicuity against all backgrounds. Mark overhead wires by alternating solid colored markers of aviation orange, white, and yellow. Normally, an orange sphere is placed at each end of a line and the spacing is adjusted (not to exceed 200 feet (61m)) to accommodate the rest of the markers. When less than four markers are used, they should all be aviation orange.

b. ***Flag Markers.*** Flags are used to mark certain structures or objects when it is technically impractical to use spherical markers or painting. Some examples are temporary construction equipment, cranes, derricks, oil and other drilling rigs. Catenaries should use spherical markers.

1. ***Minimum Size.*** Each side of the flag marker should be at least 2 feet (0.6m) in length.

2. ***Color Patterns.*** Flags should be colored as follows:

(a) Solid. Aviation orange.

(b) Orange and White. Arrange two triangular sections, one aviation orange and the other white to form a rectangle.

(c) Checkerboard. Flags 3 feet (0.9m) or larger should be a checkerboard pattern of aviation orange and white squares, each 1 foot (0.3m) plus or minus 10 percent.

3. ***Shape.*** Flags should be rectangular in shape and have stiffeners to keep them from drooping in calm wind.

4. Display. Flag markers should be displayed around, on top, or along the highest edge of the obstruction. When flags are used to mark extensive or closely grouped obstructions, they should be displayed approximately 50 feet (15m) apart. The flag stakes should be of such strength and height that they will support the flags above all surrounding ground, structures, and/or objects of natural growth.

35. UNUSUAL COMPLEXITIES

The FAA may also recommend appropriate marking in an area where obstructions are so grouped as to present a common obstruction to air navigation.

36. OMISSION OR ALTERNATIVESTO MARKING

There are two alternatives to marking. Either alternative requires FAA review and concurrence.

a. ***High Intensity Flashing White Lighting Systems.*** The high intensity lighting systems are more effective than aviation orange and white paint and therefore can be recommended instead of marking. This is particularly true under certain ambient light conditions involving the position of the sun relative to the direction of flight. When high intensity lighting systems are operated during daytime and twilight, other methods of marking may be omitted. When operated 24 hours a day, other methods of marking and lighting may be omitted.

b. ***Medium Intensity Flashing White Lighting Systems.*** When medium intensity lighting systems are operated during daytime and twilight on structures 500 feet (153m) AGL or less, other methods of marking may be omitted. When operated 24 hours a day on structures 500 feet (153m) AGL or less, other methods of marking and lighting may be omitted.

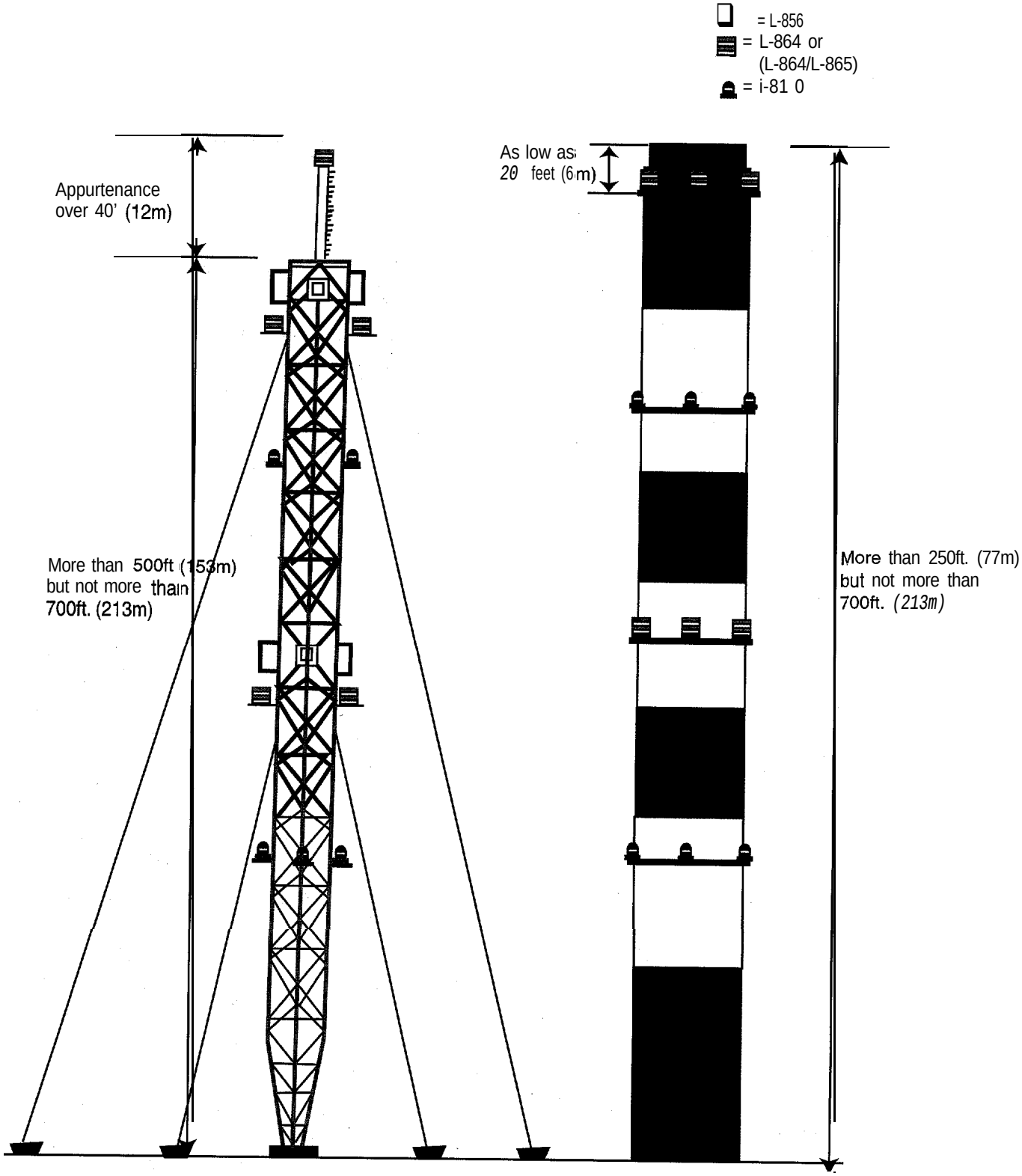
Note-SPONSORS MUST ENSURE THAT ALTERNATIVES TO MARKING ARE COORDINATED WITH THE FCC FOR STRUCTURES UNDER ITS JURISDICTION PRIOR TO MAKING THE CHANGE.

APPENDIX 1: Specifications for Obstruction Lighting Equipment Classification

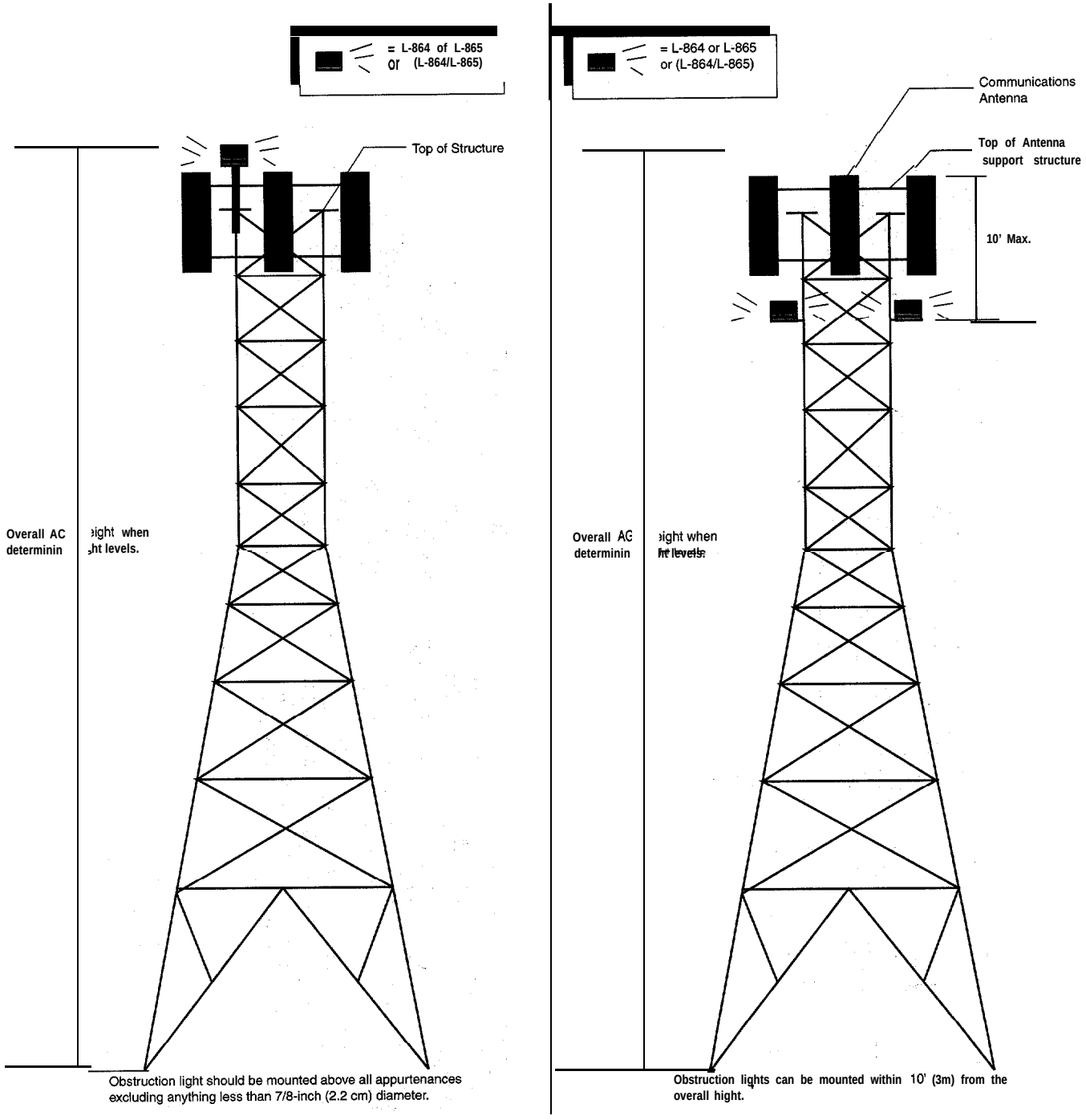
APPENDIX

TYPE	Description
L-810	Steady-burning Red Obstruction Light
L-856	High intensity Flashing White Obstruction light (40 FPM)
L-857	High intensity Flashing White Obstruction Light (60 FPM)
L-864	Flahsing Red Obstruction Light (20-40 FPM)
L-865	Medium Intensity Flashing White Obstruction Light (40-FPM)
L-866	Medium Intensity Flashing White Obstruction Light (60-FPM)
L-864/L-865	Dual: Flashing Red Obstruction Light (20-40 FPM) and dedium Intensity Flashing White Obstruction Light (40 FPM)
L-885	Red Catenary 60 FPM
FPM = Flashes Per Minute	

TBL4

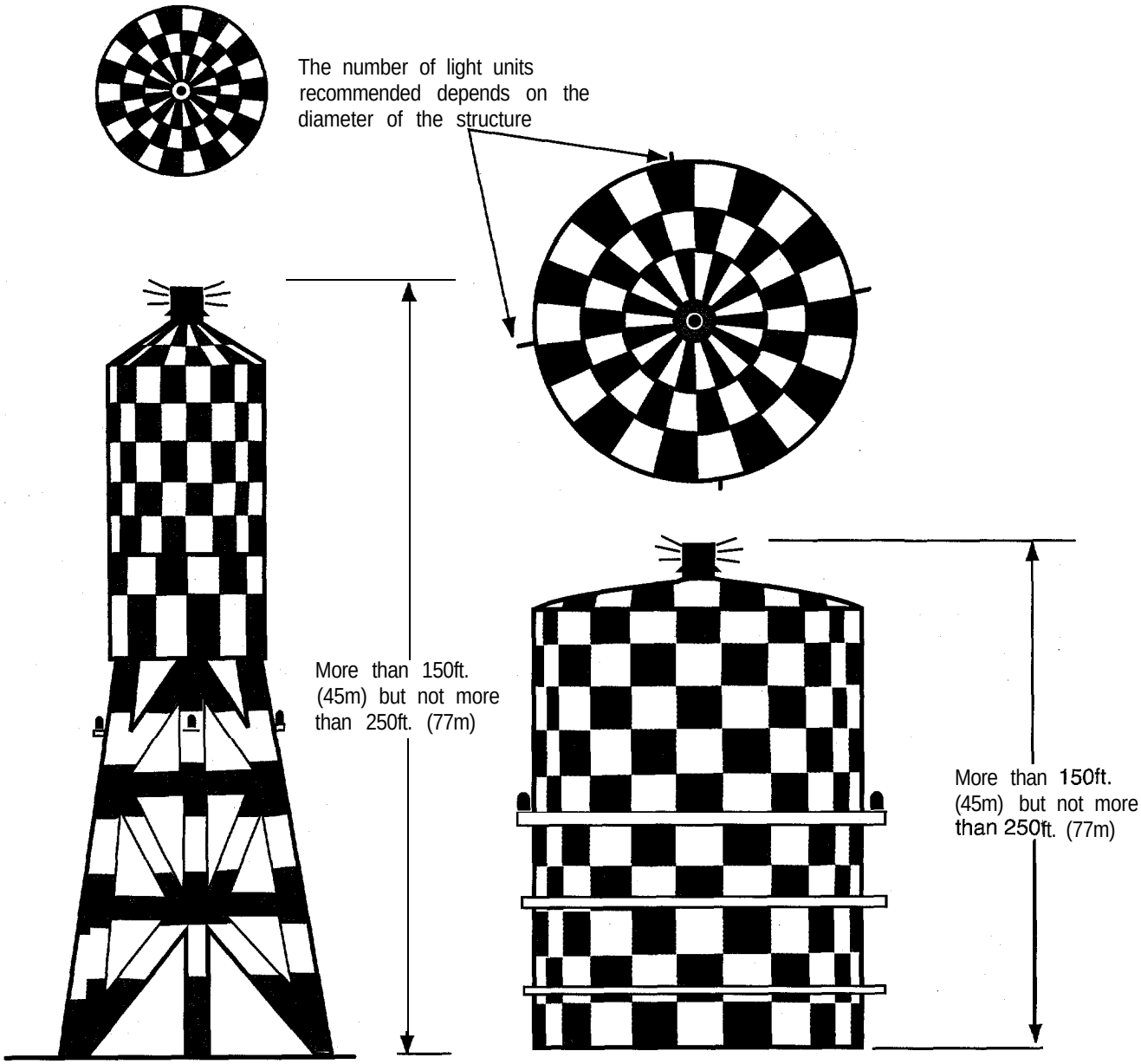

= L-856
= L-864 or
(L-864/L-865)
= i-81 0
Appurtenance
over 40' (12m)
As low as
20 feet (6m)
More than 500ft (153m)
but not more than
700ft. (213m)
More than 250ft. (77m)
but not more than
700ft. (213m)

LIGHTING FOR TOP OF STRUCTURES

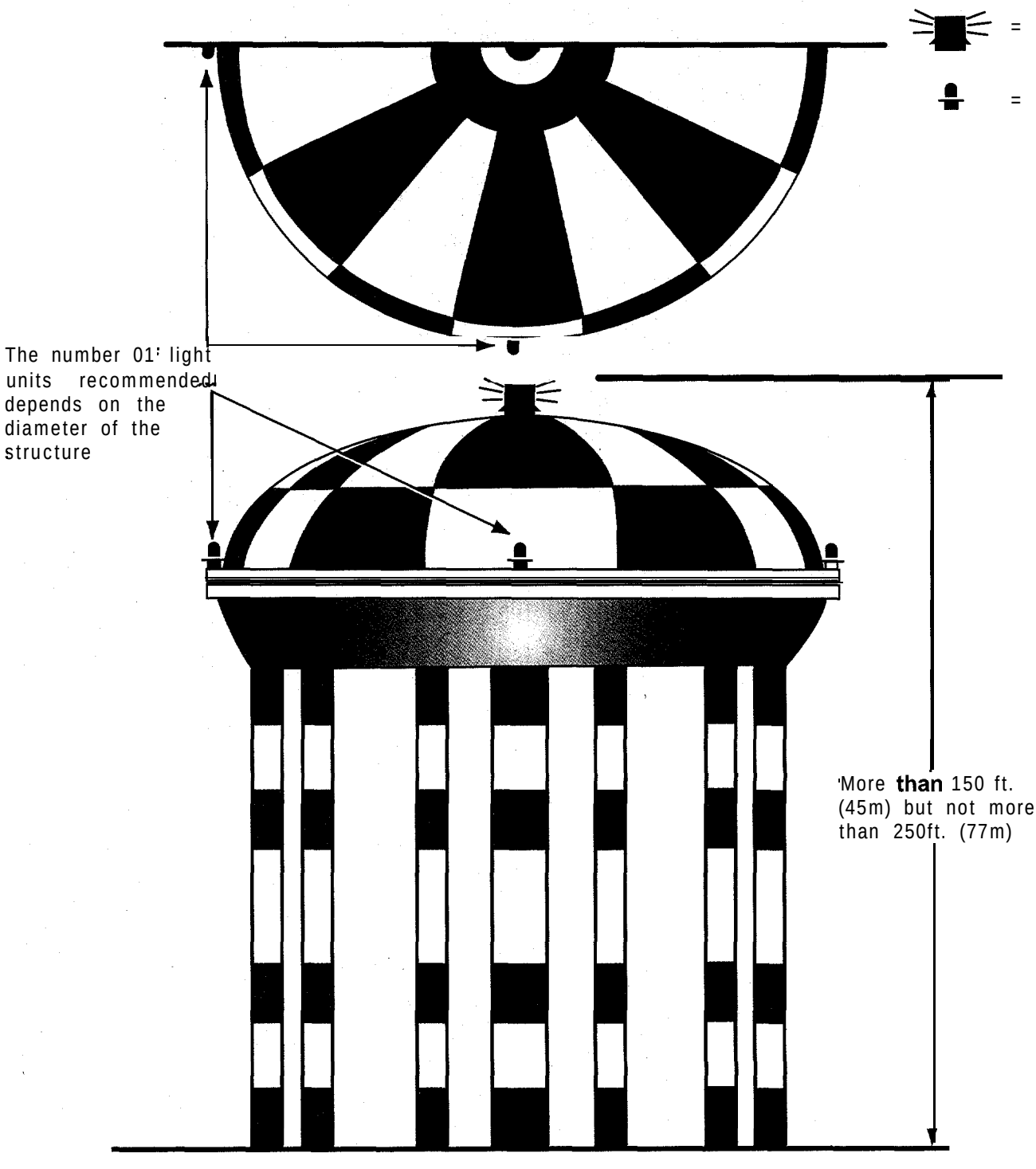


Intermediate liahtina not shown. Overall AGL height if more than 200' (61m), but not more than 500' (163m).

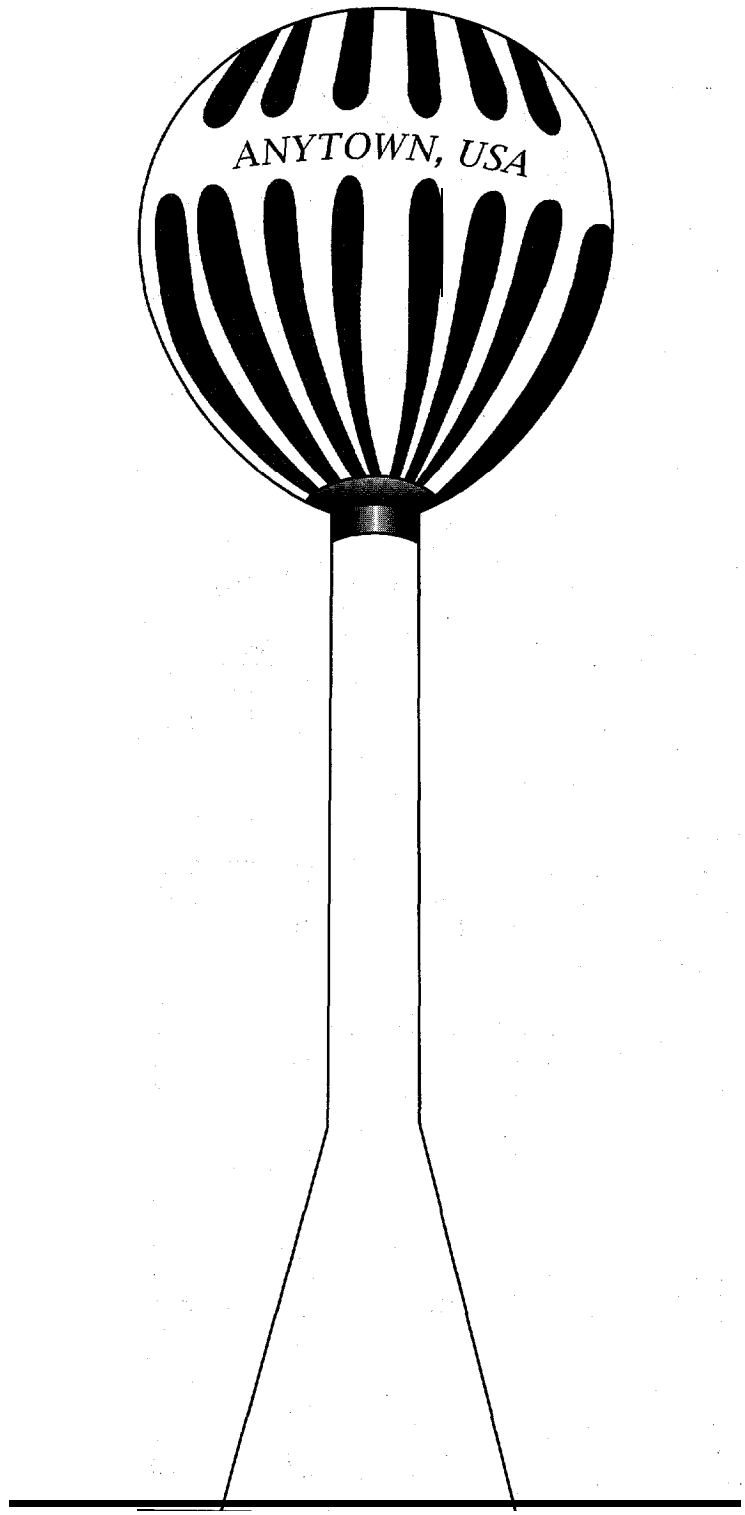
PAINTING AND LIGHTING OF WATER TOWERS, STORAGE TANKS, AND SIMILAR STRUCTURES

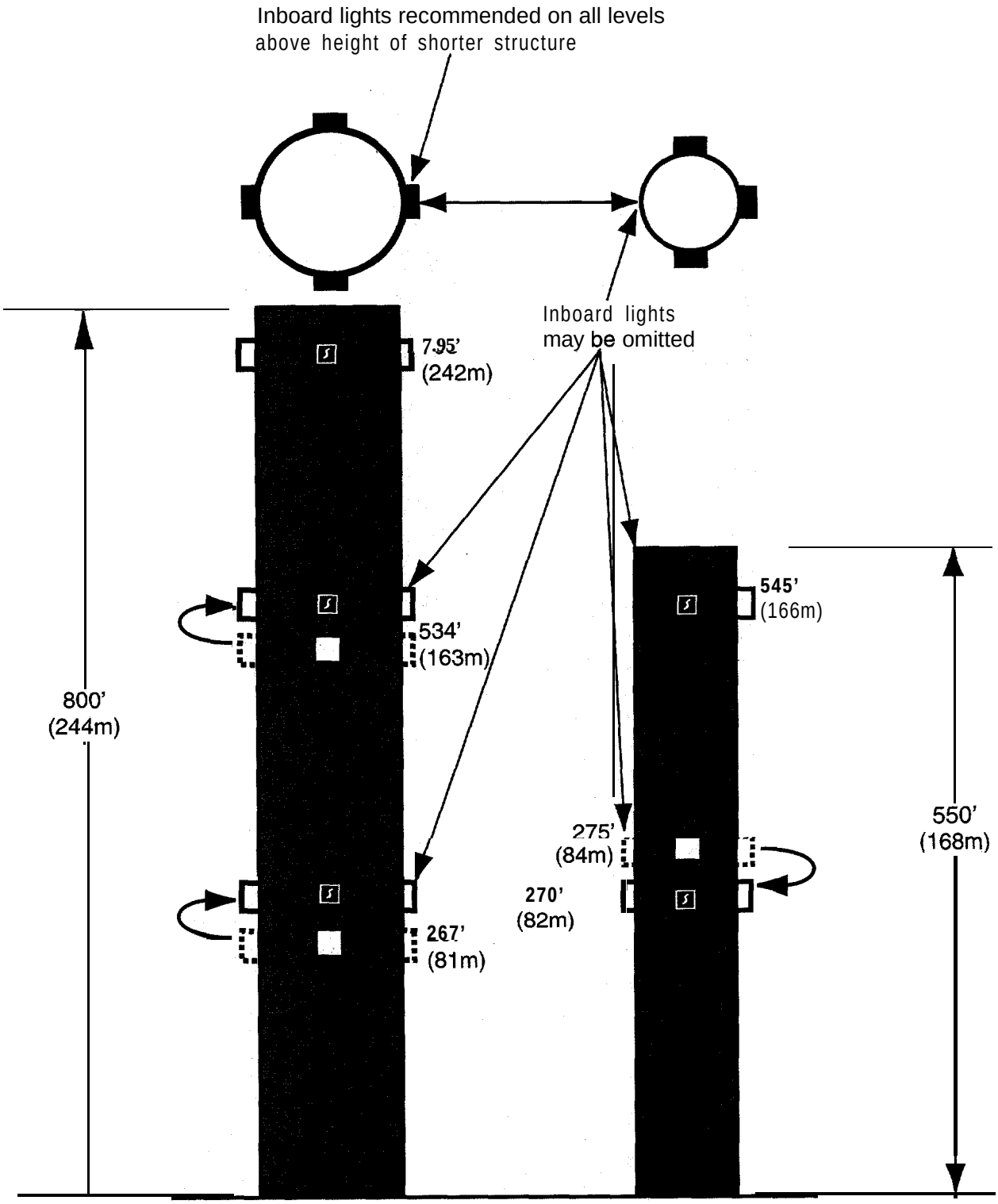


PAINTING AND LIGHTING OF WATERTOWERS ANDE SIMILAR STRUCTURES



PAINTING OF SINGLE PEDESTAL WATER TOWER BY TEARDROP PATTERN

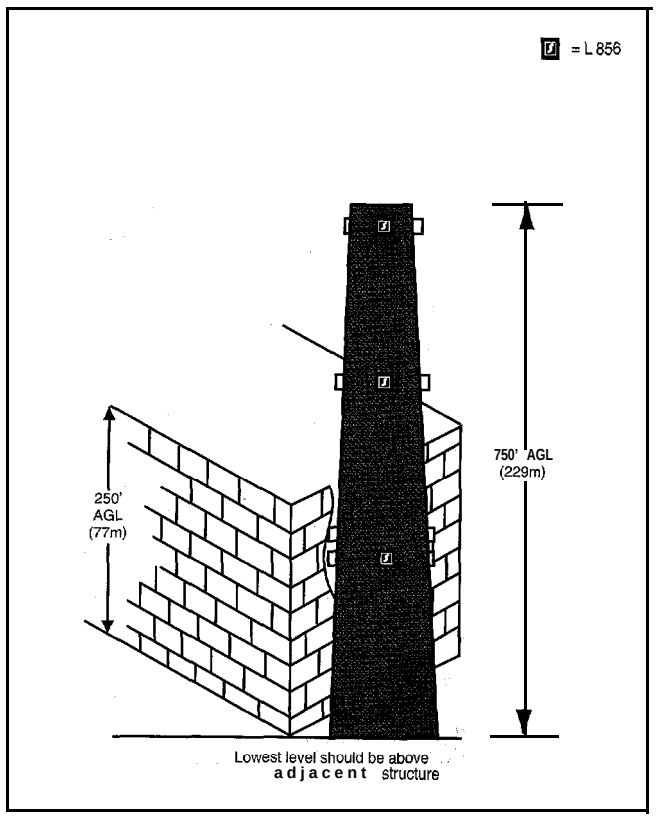




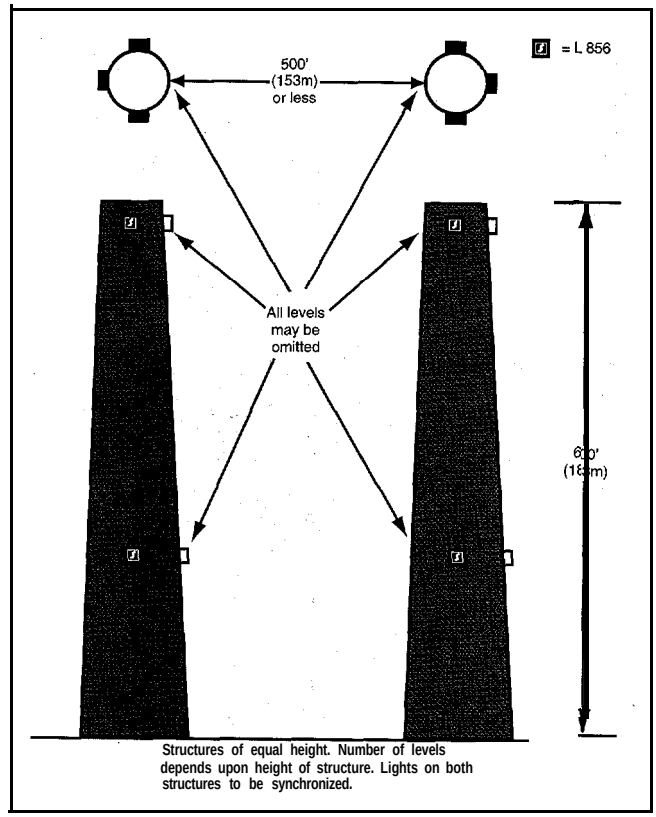
Minor adjustments in vertical placement may be made
to place lights on same horizontal plane.
Lights on both structures be synchronized

008000.ill

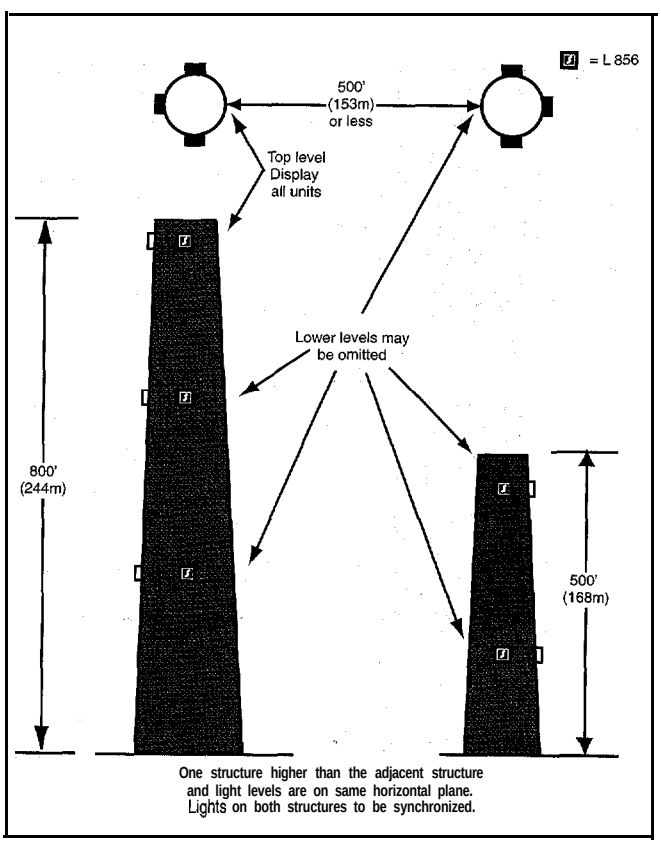
Lighting Adjacent Structure



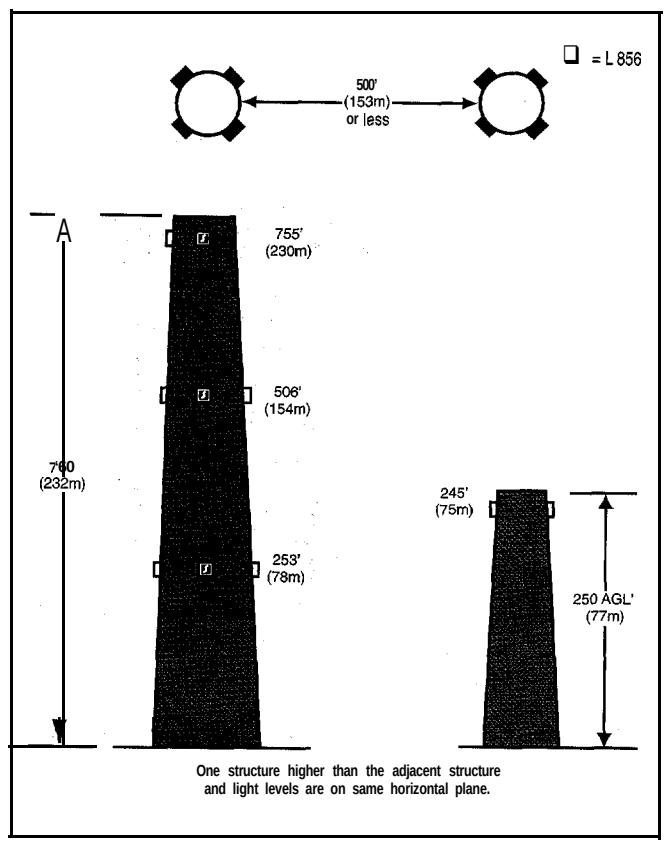
Lowest level should be above **adjacent** structure



Structures of equal height. Number of levels depends upon height of structure. Lights on both structures to be synchronized.

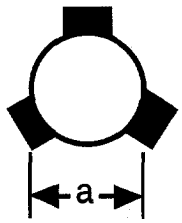


One structure higher than the adjacent structure and light levels are on same horizontal plane. Lights on both structures to be synchronized.

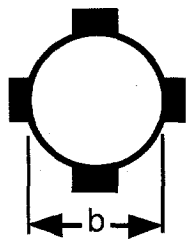


One structure higher than the adjacent structure and light levels are on same horizontal plane.

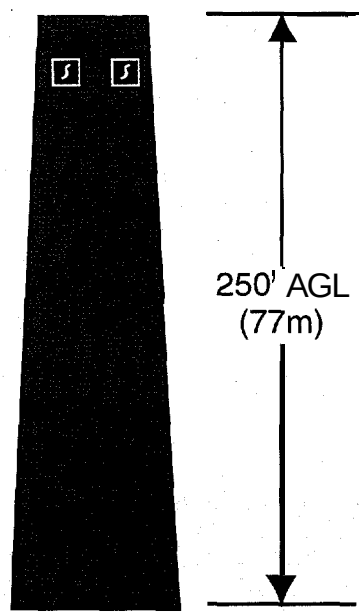
Lighting Adjacent Structure

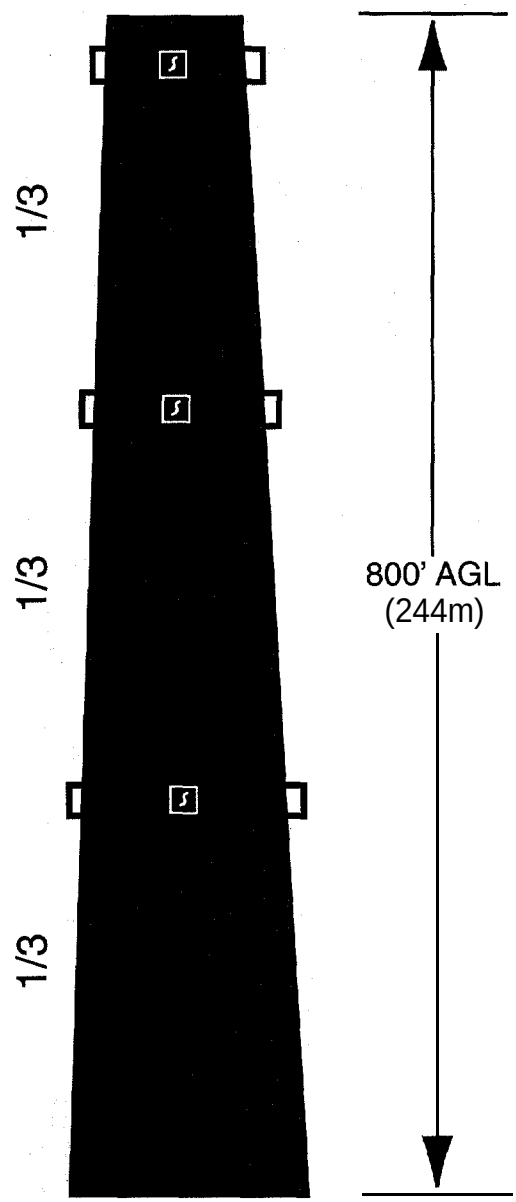


a-20' (6m) or less

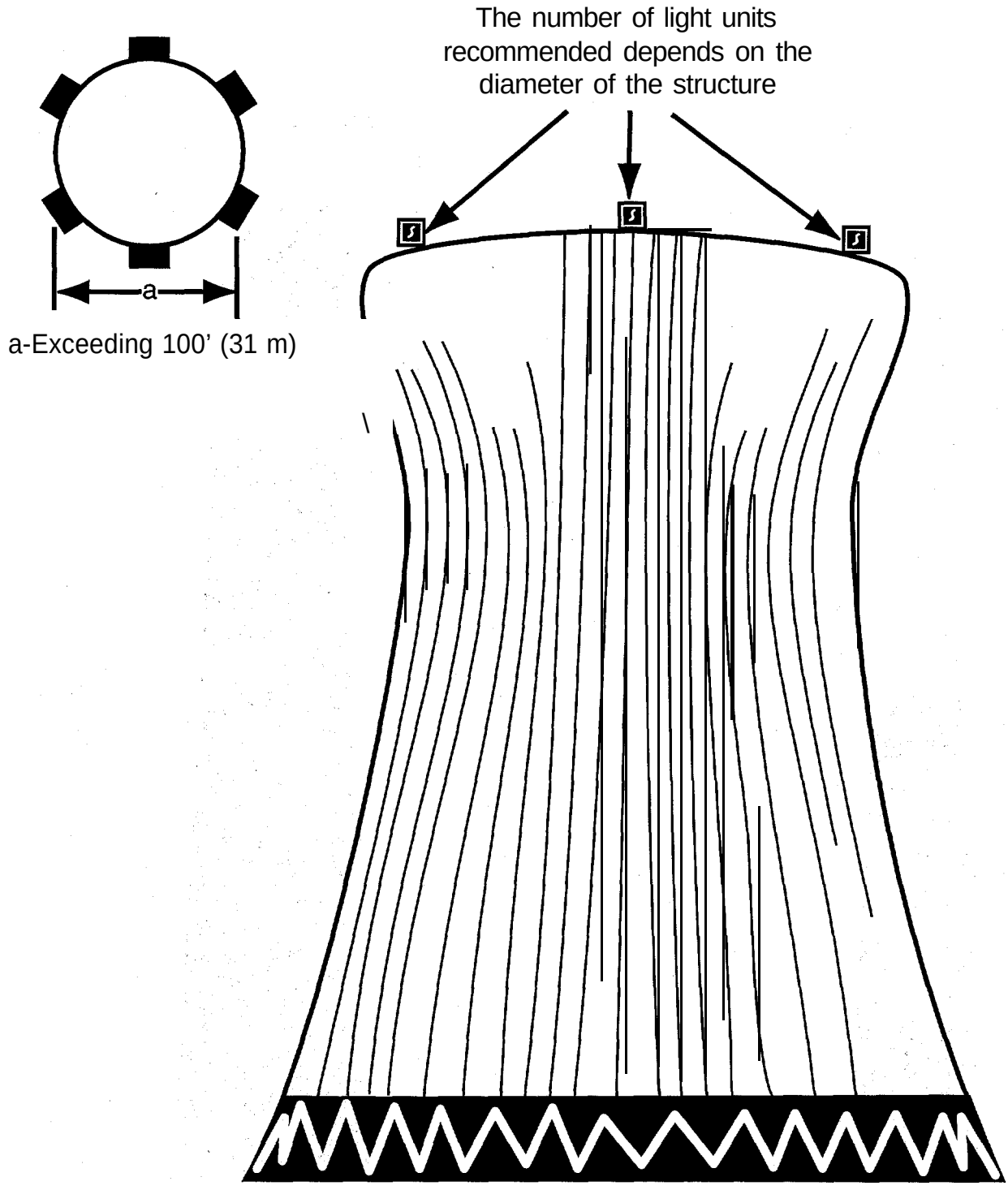


b-Exceeding 20' (6m) but not more than 100' (31 m)

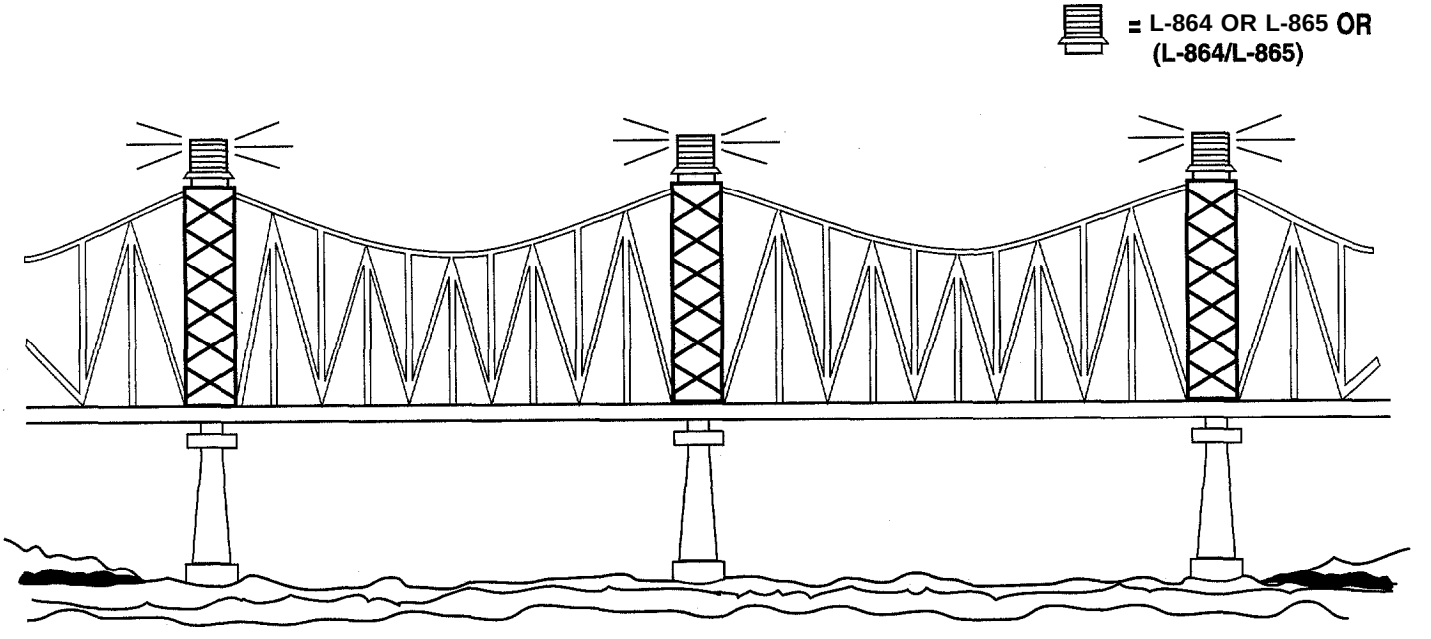




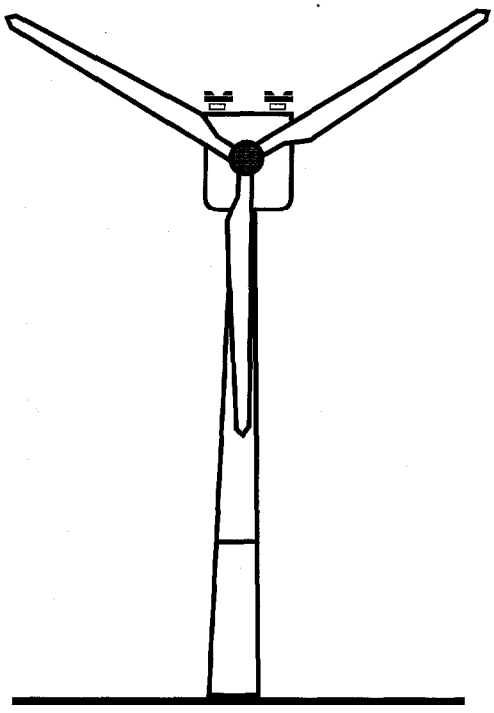
HYPERBOLIC COOLING TOWER



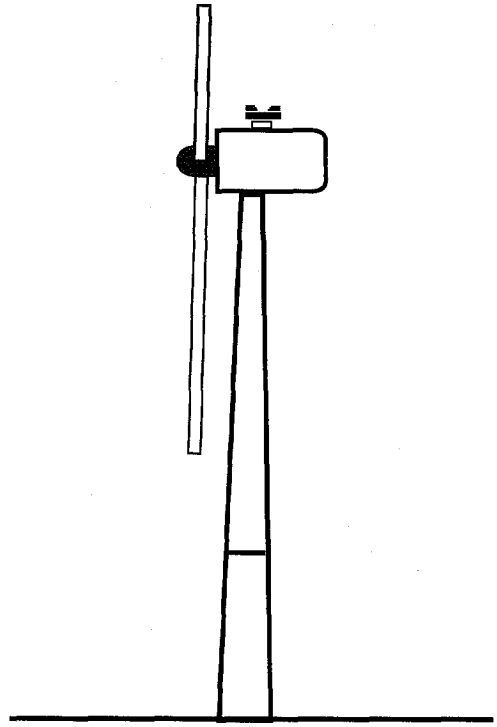
BRIDGE LIGHTING



TYPICAL LIGHTING OF A STAND ALONE WIND TURBINE



Front View



Side View

FIG 11

WIND TURBINE GENERATOR

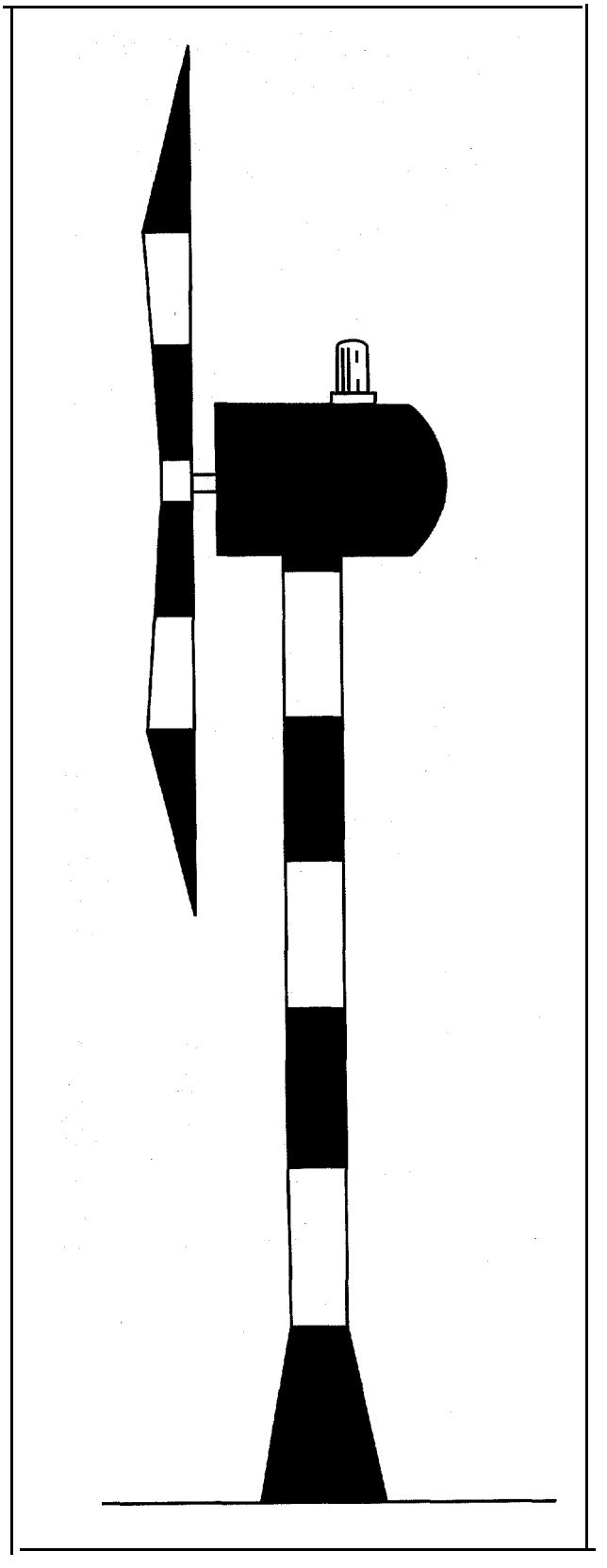
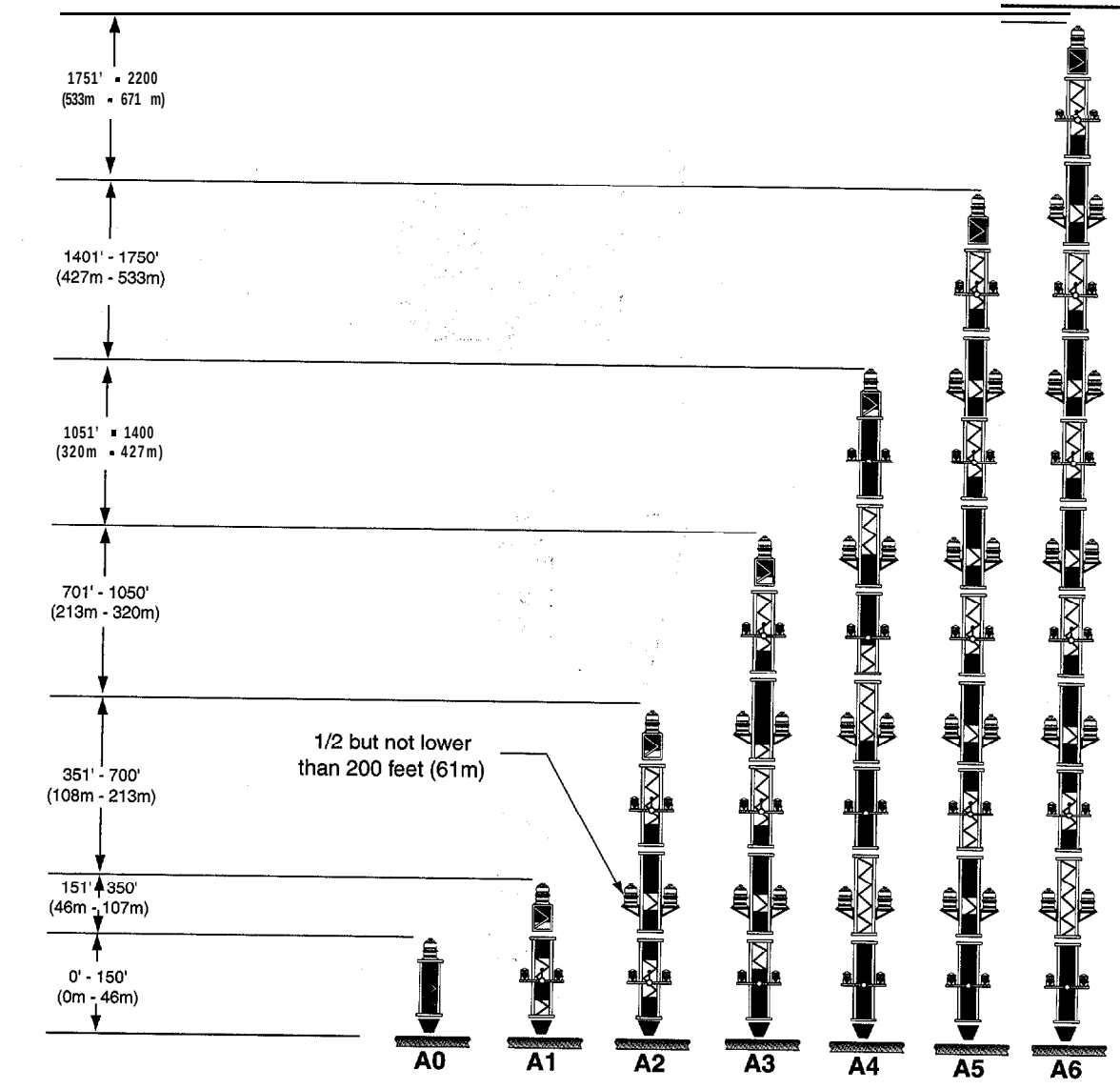


FIG 12

RED OBSTRUCTION LIGHTING STANDARDS (FAA Style A)

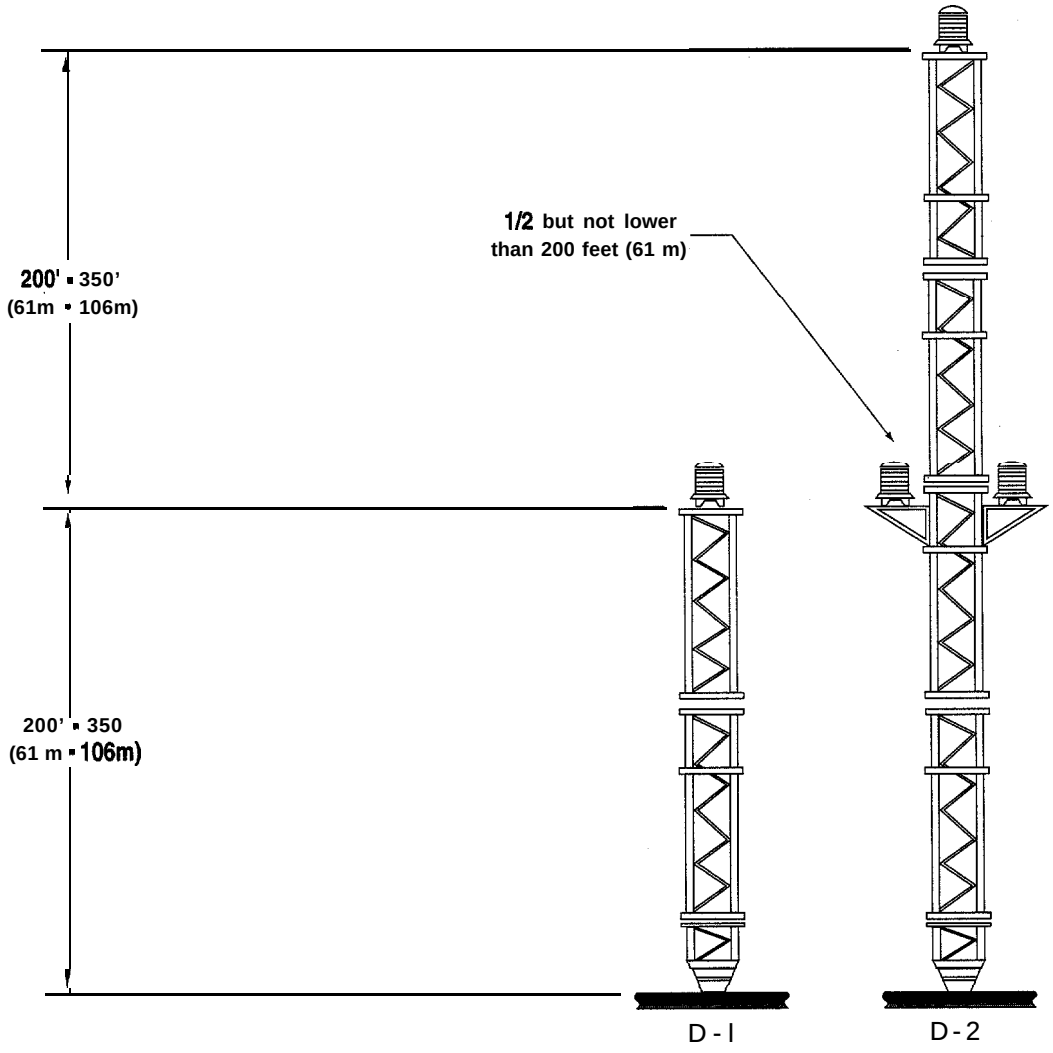
Day Protection = Aviation Orange/White Paint
Night Protection = 2,000cd Red Beacon and sidelights



- L-864 Flashing Beacon
- L-81 0 Obstruction Light

MEDIUM INTENSITY WHITE OBSTRUCTION LIGHTING STANDARDS (FAA Style D)

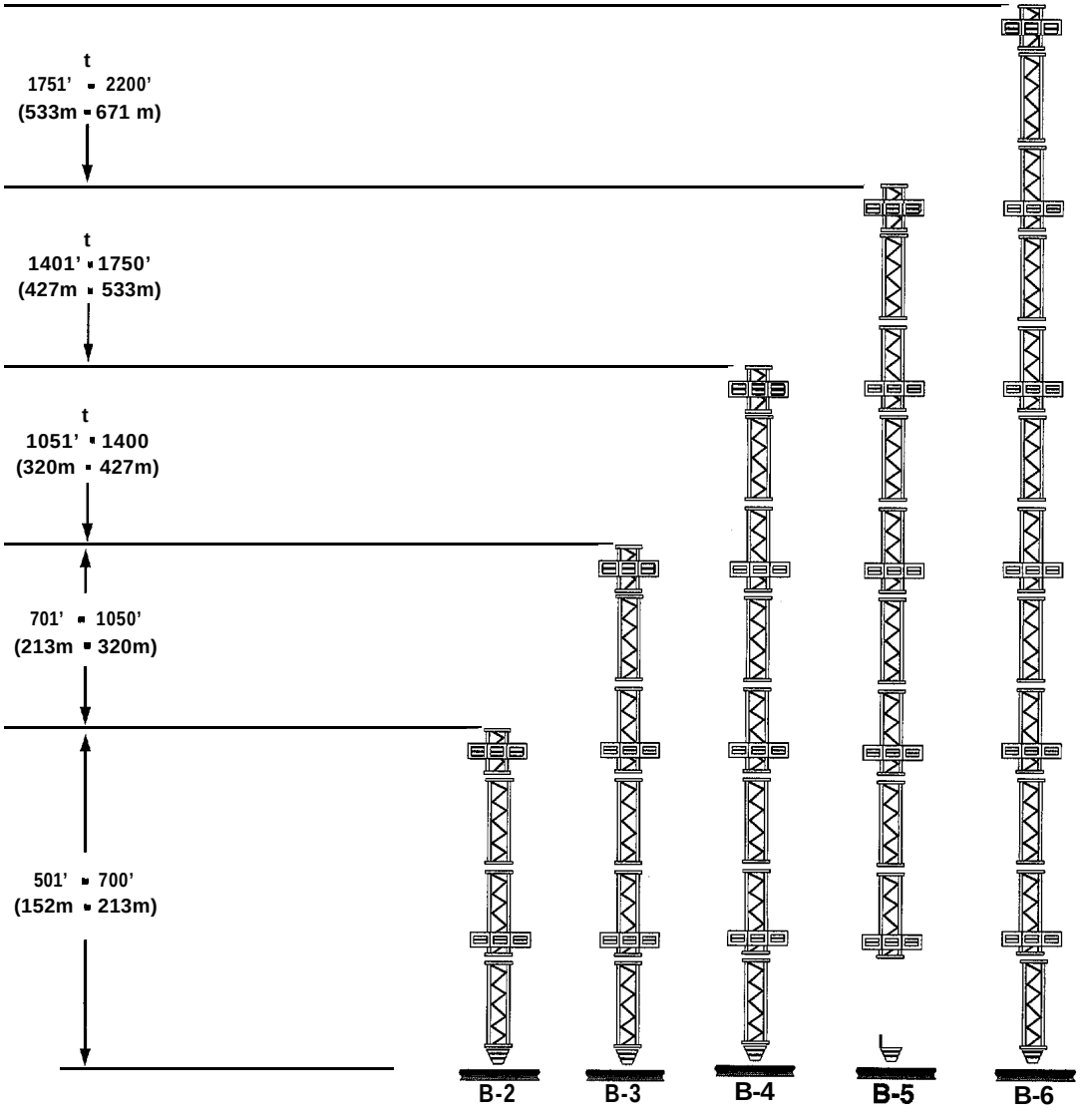
Day/Twilight Protection = **20,000cd** White Strobe
Night Protection = **2,000cd** White Strobe
Painting of tower is typically not required



- L-865 Flashing White Strobe

HIGH INTENSITY OBSTRUCTION LIGHTING STANDARDS (FAA Style B)

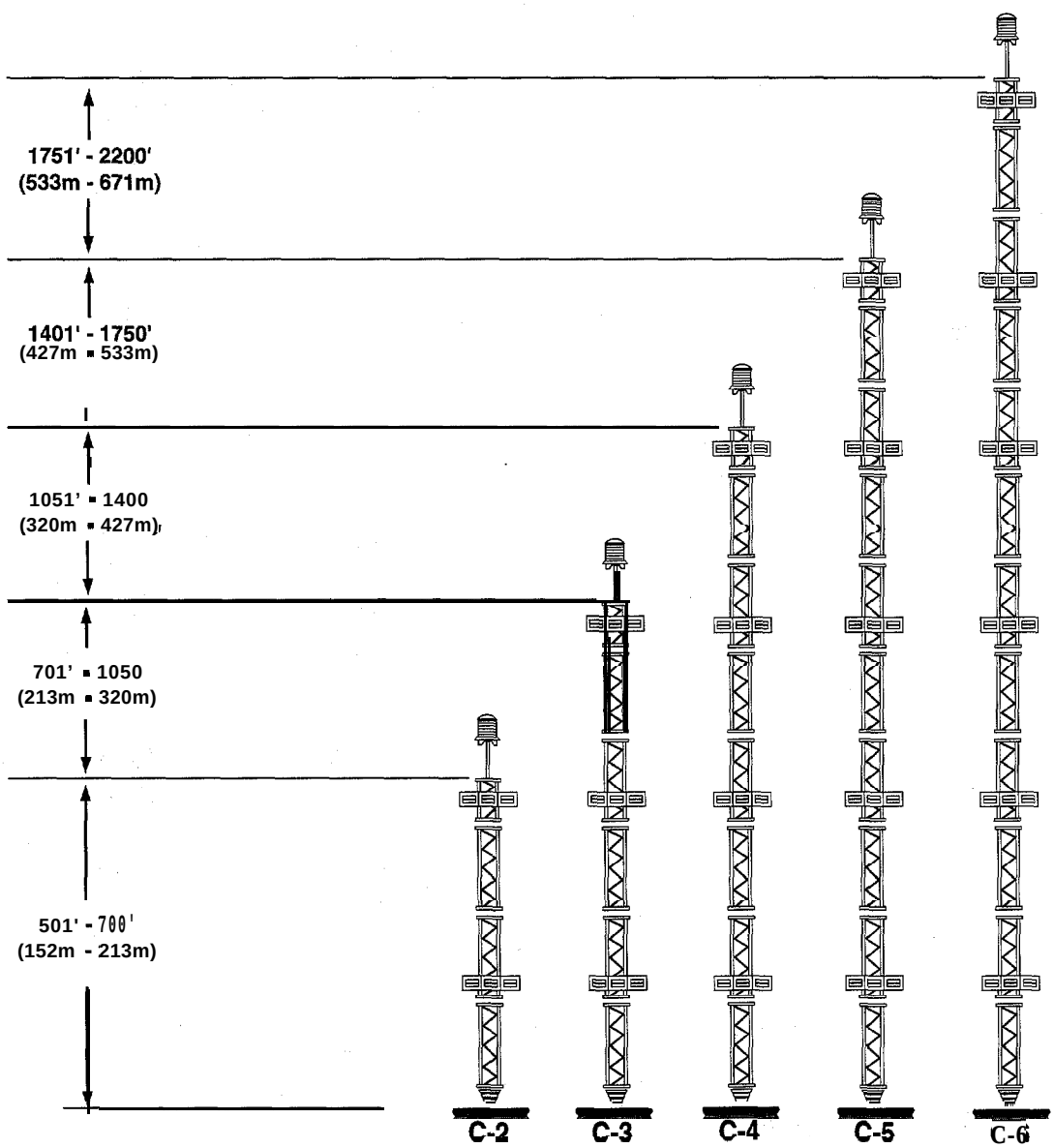
Day Protection = 200,000cd White Strobe
Twilight Protection = 20,000cd White Strobe
Night Protection = 2,000cd White Strobe



- L-866 High Intensity Strobe
(3 Flashheads required per Level fgor 360° coverage)

HIGH INTENSITY OBSTRUCTION LIGHTING STANDARDS (FAA Style C)

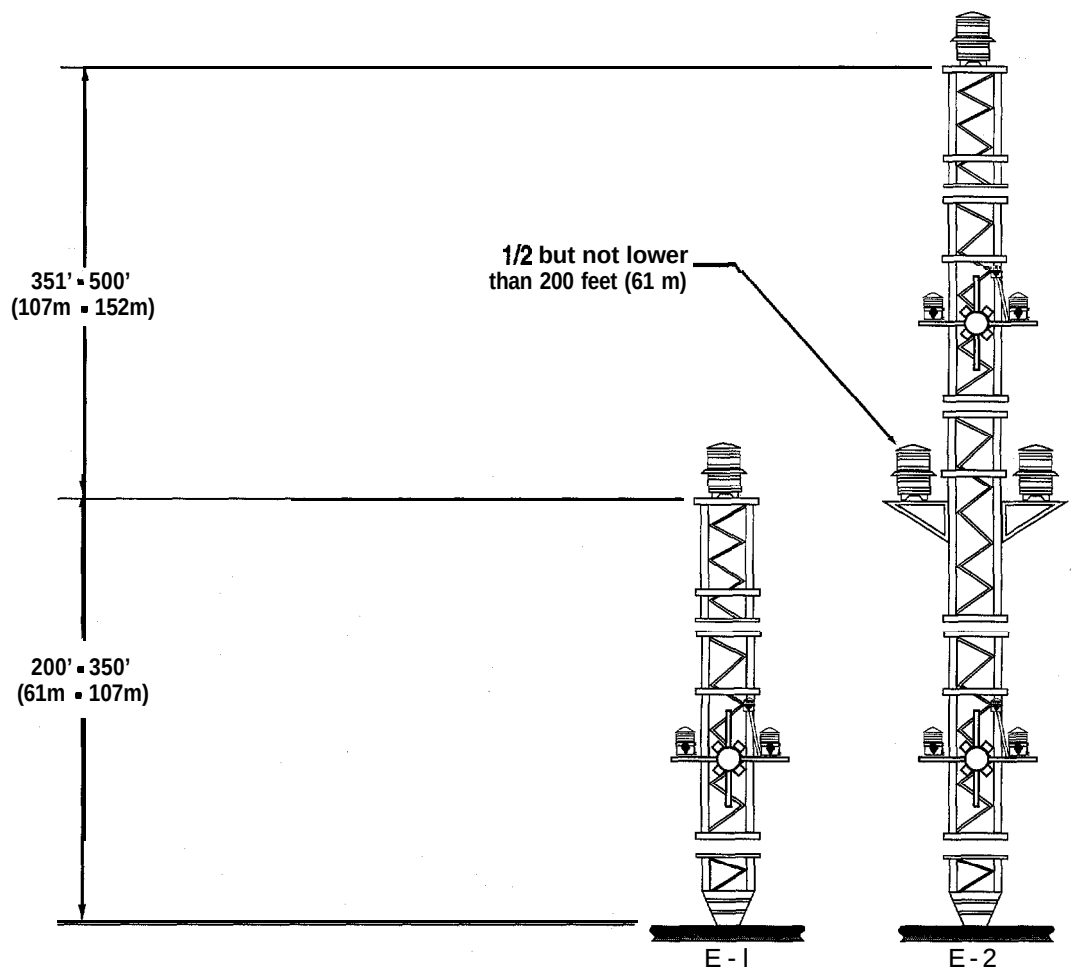
Day Protection = 200,000cd White Strobes
Twilight Protection = 20,000cd White Strobes
Night Protection = 2,000cd White Strobes



- L-856 High intensity Strobe (3 Flashheads required per Level for 360° coverage)
- L- 865 Medium Intensity Strobe required for a;dlft[pqieojt of 40 feet or greater

MEDIUM INTENSITY DUAL OBSTRUCTION **LIGHTING** STANDARDS (FAA Style E)

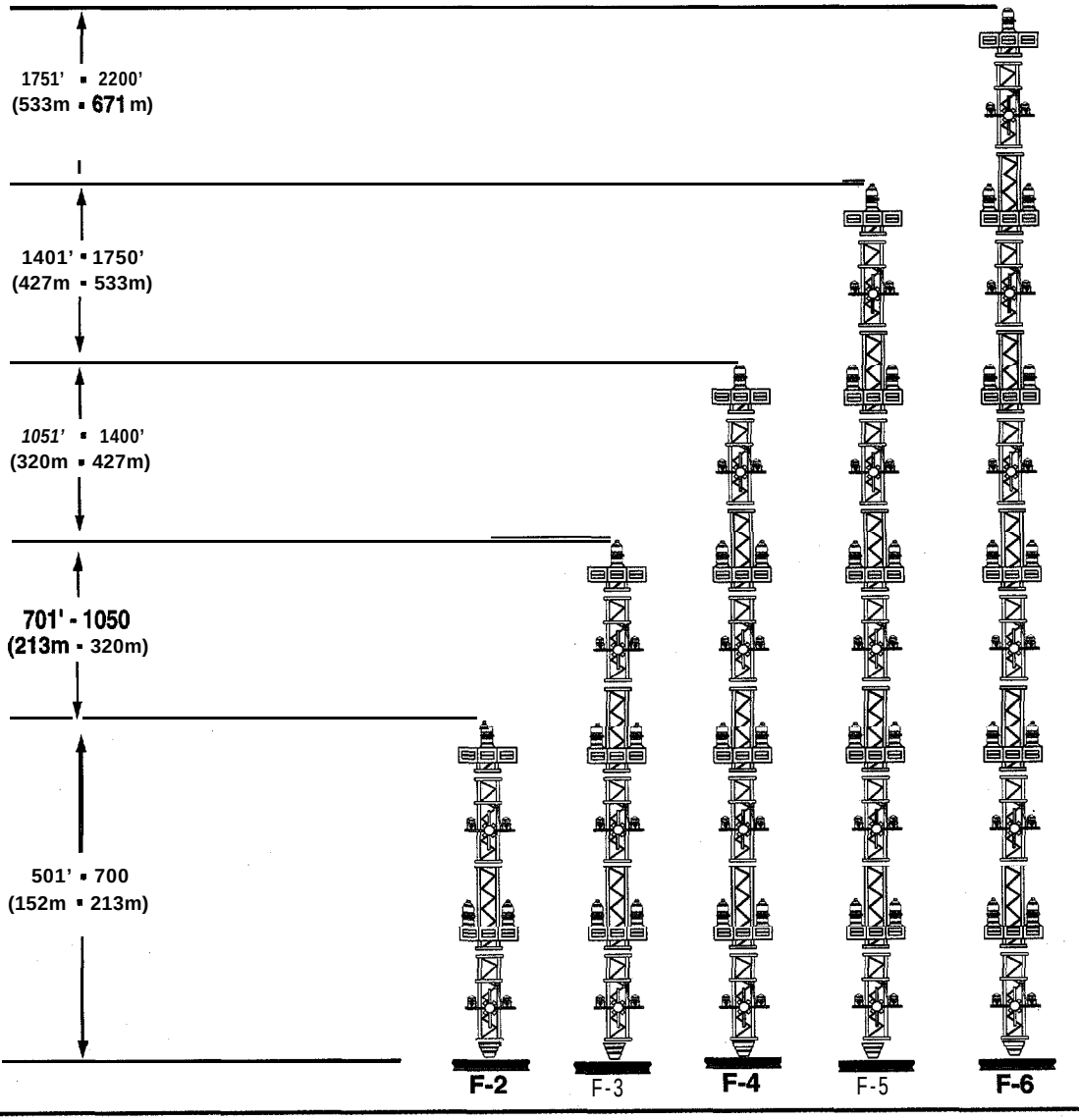
Day/Twilight Protection = **20,000cd** White Strobe
Night Protection = **2,000cd** Red Strobe and sidelights
Painting of tower is **tyically** not required.



- L-864/L-865 Flashing Dual (WhiteRed) Strobe
- L-810 Obstructure Light

DUAL **HIGH** INTENSITY OBSTRUCTION **LIGHTING** STANDARDS (FM Style F)

Day Protection = 200,000cd White Strobe
Twilight Protection = 20,000cd White Strobe
Night Protection = 2,000cd Red Beacon and sidelights



- L-854 Flashing Beacon
- L-810 Obstruction Light
- L-856 High intensity Strobe (3 Flashheads required per level for 360° coverage)